On the Accidental Production of Temporary Errors of Division on a Graduated Circle.   By W. M. Witchell.

(*Communicated by the Astronomer Royal.*)

During an examination, undertaken recently, of the micrometer screws of the Greenwich Meridian Circle reading microscopes, a suggestive discovery was made.

Six observations of " runs " had been taken over each of three consecutive intervals of 5′, and these agreed among themselves quite normally so long as the same interval was under consideration; but when the results from the different intervals were compared a discordance much beyond the probable accidental error of observation appeared between the values obtained at pointer reading 89° 35′–40′, and those at 89° 40′–45′.

As will be seen from the following figures, the discordance amounted to $0^r\cdot014$ or $0''\cdot84$, and an attempt to trace its origin was necessary.

Value of 5′ of Circle in " Mean Micrometer."

	Pointer 89° 35′ to 89° 40′. r	Pointer 89° 40′ to 89° 45′. r
Set 1 . .	4·903	4·893
,, 2 . .	·912	·892
,, 3 . .	·908	·897
,, 4 . .	·907	·894
,, 5 . .	·904	·893
,, 6 . .	·908	·891
	4·907	4·893

Difference : $0^r\cdot014$

An accidentally large deviation from the mean division error at this part of the circle was at first suspected.   A search for others of like magnitude in the neighbourhood, however, produced negative results.   But when these observations (which consisted of three sets of runs over each 5′ interval from pointer reading 88° 20′ to 89° 20′) were arranged so as to exhibit the values from the six micrometers individually, and were compared with the former series similarly arranged, it was at once seen that the discordance took its origin in a large apparent error of the particular graduation viewed by microscope D when the pointer reads 89° 40′.   The figures follow.   They were considered to give strong evidence of an error amounting to $0^r\cdot03$ of micrometer, or $1''\cdot8$ in this graduation, inasmuch as the mean screw measurements of the two adjacent intervals appeared to be too large and too small respectively by approximately this quantity.

Measurement of 5′ Interval, 89° 35′–89° 40′ pointer reading.

Micrometer	A	B	C	D	E	F
	r	r	r	r	r	r
Set 1 . .	4·910	4·905	4·887	4·931	4·909	4·874
,, 2 . .	·914	·917	·915	·937	·914	·876
,, 3 . .	·927	·908	·899	·927	·918	·870
,, 4 . .	·911	·920	·897	·923	·910	·883
,, 5 . .	·899	·918	·896	·912	·906	·891
,, 6 . .	·920	·921	·891	·924	·901	·889
Mean .	4·914	4·915	4·898	4·926	4·910	4·880

Corresponding means of 36 other sets, viz. 3 over each 5′ interval from 88° 20′ to 89° 20′ :—

4^r·923	4^r·918	4^r·890	4^r·901	4^r·916	4^r·884

Measurement of 5′ Interval, 89° 40′–89° 45′ pointer reading.

Micrometer.	A	B	C	D	E	F
	r	r	r	r	r	r
Set 1 . .	4·916	4·921	4·871	4·868	4·902	4·880
,, 2 . .	·913	·910	·869	·867	·905	·885
,, 3 . .	·917	·892	·881	·873	·916	·902
,, 4 . .	·910	·899	·889	·890	·902	·876
,, 5 . .	·896	·916	·868	·875	·911	·890
,, 6 . .	·925	·908	·891	·854	·905	·863
Mean .	4·913	4·908	4·878	4·871	4·907	4·883

Now in the winter months it has been customary to protect the circle from tarnish by applying to it a thin film of vaseline, which, however, gradually accumulates small particles of dust and is removed from time to time.

Before proceeding to a systematic examination of the circle for possible errors of like nature in other graduations, the part under actual suspicion was wiped clean; when it was found that the supposed error of nearly 2″ in the division in question had absolutely disappeared, presumably with the dusty vaseline.

It should be stated here that the microscopes were in good focus and adjustment.

Other divisions being similarly experimented upon gave no difference, before and after, at all comparable with the foregoing, except in one case (the figures for which are quoted below), so that the liability to error introduced by this method of preserving the circle is probably both slight and casual. At the same time it is distinctly real, and may be the explanation of discordances which cannot be ascribed with certainty to other agencies.

The following are micrometer readings for ten bisections of the division under microscope E (pointer reading 164° 45′) before and after wiping off the vaseline :—

Before.		After.	
	r	r	r
608	·611	·633	·618
·613	·612	·627	·620
·603	·604	·629	·624
·589	·593	·620	·632
·600	·590	·622	·624
Mean r·602		Mean r·625	

Difference : r·023 = 1″·40

As a consequence of these revelations, the cleaning of the circle, which hitherto has naturally been avoided as much as possible for fear of injuring the graduations, will be carried out more frequently.

Observations of Minor Planets from Photographs taken with the 30-inch Reflector of the Thompson Equatorial at the Royal Observatory, Greenwich, during the year 1903.

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The following positions of minor planets were obtained from photographs taken with the 30-inch Reflector during the year 1903.

The plates were measured with the astrographic micrometer. Four reference stars were, as a rule, measured with the planet, their positions being derived when possible from the Catalogues of the Astronomische Gesellschaft.

The positions given are not corrected for Parallax.

log Parallax Correction = log Parallax Factor − log Δ.

The anonymous planet was found on the same plate as (407) Arachne.

Date and G.M.T. 1903.				Apparent R.A.			Apparent Dec.			Log. Parallax Factor. R.A.	Dec.
d	h	m	s	h	m	s	°	′	″		
					(258) Tyche.						
May 25	10	41	29	14	38	6·48	− 7	40	58·1	+8·321	+0·876
26	9	55	41	14	37	25·65	− 7	34	56·3	+8·669	+0·876
					(68) Leto.						
May 29	11	25	13	15	13	48·14	− 20	43	7·1	+8·723	+0·921
June 2	10	46	9	15	10	18·77	− 20	38	24·5	+8·462	+0·921
3	10	29	3	15	9	28·86	− 20	37	15·3	+7·931	+0·922
4	10	4	18	15	8	40·18	− 20	36	7·5	−8·408	+0·921